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been obtained chiefly in this region by various naturalists, principally those of the Mexican Boundary and Pacific Railroad Surveys. One which they seem to have overlooked, although the most remarkable, perhaps, because inhabiting such a desert region, I described, after my return, as Agassiz's Land-tortoise (*Xerobates Agassizii*). In size it is about equal to the species of the Gulf Coast, but differs in color and other particulars. The Indians hunt for them on the mountains among cacti and other fleshy-leaved plants, on which they probably feed, rarely or never descending to the valleys. A Water-turtle (*Actinemys marmorata*) also lives in the Mojave River. One small Cyprinoid fish (*Algansea formosa*) has been found by Dr. Heermann in this stream.

Towards the sink, or "Soda Lake," which rarely contains water, the sand becomes very dry and almost bare of vegetation. A few trees (*Chilopsis linearis*) of small size grow there, and among them I saw a flock of the Arctic Bluebird (*Sialia arctica*). The only other bird of interest seen east of this was the pretty Black-throated Finch (*Poospiza bilineata*), which is pretty common in the shrubby tracts.

HINTS ON TAXIDERMY.

BY C. A. WALKER.

[Continued from page 146.]

The method of collecting, preserving, and mounting birds. The first specimen procured, however imperfect, should always be preserved until a better one can be obtained. As soon as a bird has been killed, the following directions should be carefully observed. Fill the mouth, throat, nostrils and vent with cotton; also any shot holes which may be discovered. If there is any fresh blood upon the feathers,

sprinkle the spots with dust, sand, powdered chalk, or any other similar substances. These precautions being observed, all stains caused by blood or internal secretions will be prevented.

A paper tunnel should now be made in the same manner as those used by grocers, the bird placed in it with the head towards the point, and the upper part folded over and fixed in this position by means of a pin, taking care not to injure the tail feathers by bending or displacing them. The parcel should then be placed in a box, sufficiently large to accommodate it without crowding, and the remaining space filled with grass, paper, or any substance more easily obtained; this will prevent the specimen from being injured by friction. In our own portion of the country during the colder seasons, also in the more northern latitudes, a bird may be allowed to remain (in extreme cases) forty-eight hours before the operation of skinning is undertaken, but half the time is a safer rule. In the summer season it may be permitted to lie until the blood has coagulated and the limbs have stiffened; but in all tropical countries the operation cannot be effected with too great dispatch. If the specimen is allowed to remain any length of time beyond that above stated, the feathers about the head and abdomen are apt to fall off, thus rendering it more difficult to remove the skin; and the specimen often becomes unfit for preservation. Before skinning a bird, particular attention should be given to the color of the eyes, bill and legs, because these parts are liable to lose their tints after life is extinct, the color of the feathers upon the various parts of the body. Measurements should also be taken after the following manner, in feet, inches and fractions of an inch:

Total length from the tip of the bill to the end of the tail, the neck being stretched out in a straight line; length of the primary quills of the wing; total length of the bill, measuring either from the feathers on the forehead, following the curve of the ridge down to the tip, or from the angle of

the mouth in a straight line to the tip; the length of the tail feathers from the extremity to their insertion in the coccyx, together with their number; the length of the tarsus, from the centre of the metatarsal and tarsal joints; length of toes; length and general character of the nails; the distance between the tips of the wings when spread out to their full extent. It should be next observed whether it be male or female, young or adult; also, any change of plumage in winter or summer; the common name given it in the locality where it was collected; the exact date when it was killed, and every fact which can be ascertained concerning its habits. "The sex of the specimen may be ascertained after the operation of skinning has been completed, by making an incision in the side, near the vertebræ, and exposing the inner surface of the 'small of the back.' The generative organs will be found tightly bound to this region (nearly opposite to the last ribs), and separating it from the intestines. The testicles of the male are two spheroidal or ellipsoidal whitish bodies, varying from the size of a pin head to that of a hazel-nut, according to the season. The ovaries of the female, consisting of a flattened mass of spheres, variable in size with the season, will be found in the same region."* All of the above statements should be plainly written upon slips of parchment or pasteboard, with ink, and attached to the corresponding specimen, or recorded in a blank book, with a number corresponding to the one attached to the specimen.

When practicable, nests and eggs should be preserved with the birds to which they belong, and all information concerning dates and places where they were found. Drawings of specimens will also be useful, both in mounting and as a source of reference. Many may consider the above directions, or at least a greater portion of them, of not much importance, but if they are carefully observed and practiced, the value of the collection will be greatly enhanced, since such information is of the utmost importance in scien-

* Report of the Smithsonian Institution.

tific researches. Even should they not be destined for these purposes, the amateur will find his collection rendered far more interesting and instructive.

The collector should be provided with a light double-barrelled gun, the best of powder, and shot of various sizes, No. 10 being used for killing small birds, as it is least injurious to the plumage. Humming Birds should be killed with dust shot. Early in the morning and after sunset are the best periods of the day for procuring birds. If the collector be in any tropical country, he should choose early dawn for his excursions, on account of the coolness of the air. It is also the time when the birds are seen and heard in greatest numbers. Birds in tropical countries are generally so tame, that they can be easily approached and with little skill; a sufficient number can be killed in the space of two or three hours, to occupy the collector during the remainder of the day. It is a good rule *never to kill more specimens than can be preserved during the day*. In some parts of tropical America, Humming Birds, Creepers, and other small birds are shot with blow-pipes by the natives, and they are killed in this manner without the least injury to their plumage. Many are also caught by means of birdlime, and in springes, and specimens secured by these means are the best for preservation.

The method of skinning a bird.—One of the most important points of taxidermy, is a correct knowledge of the method of skinning a bird, so that when the operation is finished, the skin may be as perfect as possible and free from all stains. It is impossible for any one to mount a specimen neatly and artistically, from a soiled or mutilated skin. There are many instances, however, in which it may be necessary to mount poor skins from their rarity; these should never be rejected, for a specimen badly stuffed is better than none at all, and will answer until a more perfect one can be obtained. There are two things essential to success, viz., patience and practice; and a good store of both will enable

one to perform the operation with ease and dispatch. Care should always be taken not to stretch the skin, in order that its natural dimensions may be preserved.

Before proceeding to work, provide yourself with a cup of Indian-meal, cotton, needle and thread, scalpel and preservative. In the first place examine the bird, and if any spots of blood be discovered, sprinkle them with Indian-meal, and rub it back and forth with the fingers, supplying fresh meal from time to time; this will remove it entirely. If the blood be dry, apply a little warm water with a sponge, and wash the spot gently. In this manner I have cleaned the entire breast of a bird stained with blood. If any of the feathers are bent, they may be restored to position by immersing them in warm water. Remove the cotton from the mouth, nostrils and vent, and replace it with fresh stuffing. A piece of small but strong twine should now be passed from one nostril through the other on the opposite side, and bringing the ends downward tie them beneath the lower mandible, leaving them a little longer than the neck of the bird. This will aid the operator in turning the head back to its natural position after the operation of skinning has been finished. Now take an accurate measurement from the tip of the bill to the end of the tail; also the girth of the body behind the wings. The bird is then ready for the operation. Placing it upon its back with the tail turned towards your right hand, with the left separate the feathers from the lower extremity of the breastbone, quite down to the vent, laying them to the right and left so that the skin beneath is visible. Place the scalpel upon the lower tip of the breastbone and cut the skin from this point in a straight line to the vent, taking care not to sever the thin muscular tissue which covers the intestines; should this have become accidentally cut, thereby exposing the intestines, remove them at once, that they may not soil the feathers. The skin must now be separated from the flesh on either side of the incision by passing the flat portion of the scalpel handle be-

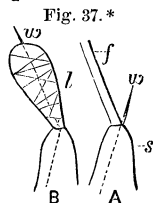
tween the skin and the body. It will be found that some birds have the skin bound much closer to the flesh than others by means of small ligaments; these must be severed with the scalpel. When the skin is loosened from its attachments quite down to the back, and the thigh laid bare, the latter should then be pressed inward and the skin turned back, in order that the leg may be separated from the body at the second joint, or the junction of the tibia with the fibula. Repeat the operation with the other side. Next, the rump, or that part into which the tail feathers are fixed, should be severed from the body at the junction of the last dorsal vertebra with the coccyx, taking care not to cut the skin upon the back. Should blood at any time be discovered, absorb it with Indian-meal, and the oily matter proceeding from the fat (which is to be especially avoided in all the marine species) may be absorbed with a little powdered chalk. If the bird is a large one, it may be now suspended by means of a large fish-hook with the barb filed off, and attached to a strong cord, which will aid greatly in removing the remaining part of the skin; but if it is a small one, it should be placed upright upon its breast, with the head lying backward. In this position the skin should be removed from the back and breast, by using the back of the scalpel as stated before, until the wings are reached upon both sides. These are to be severed from the body at the shoulder-joint. It will be found to be much easier to unjoint them by cutting beneath instead of above the joint. The neck having been reached, must be turned out until the back part of the skull is laid bare. Having separated the cervical vertebræ, or the vertebræ of the neck, close to the head, remove the ear by separating the thin skin by which it is bound to the ear-socket, being cautious not to injure it by tearing or cutting. By close examination it will be seen that the eyelid is bound to the edge of the socket by a thin skin; this should be completely severed, thereby freeing the lid from its attachments. The eyes

may then be removed by passing the blade of the scalpel beneath the ball and severing the optic nerve, endeavoring not to burst the former, as the humors contained within would then ooze out, and flowing through the eyelids, soil the feathers upon the head. Next cut away the tongue, together with the flesh beneath the mandibles and upon the various parts of the head, and through an opening made in the lower part of the skull carefully remove the brain. It is well to remark here that the heads of some birds are so large in comparison with the neck, as to render it impossible for the head to be turned out in the ordinary way without stretching the skin. In this case the vertebræ of the neck should be separated close to the skull, the body taken out and laid aside, and the head pulled back into its natural position. An incision is then made through the skin upon the back of the head, large enough to permit the passage of the skull, and this should then be cleaned in the same manner as stated above. Ducks, woodpeckers, flamingoes, macaws, etc., come under this rule. After the preservative has been applied to every part, and the cavities of the brain and eye filled with cotton, restore it to position, being careful to sew up the incision neatly. The wings should next be turned out, exposing two joints. The humerus may then be removed, but the double bone, consisting of the radius and the ulna, should be carefully cleaned and allowed to remain. Many taxidermists prefer to have all the bones left in their places. This, I think, should be a rule in preparing dried skins, as the wings retain their position better; but when a skin is to be mounted at once, I remove the humerus, and then find it much easier to set them. It is also a practice with many, in lieu of turning the wings, to make a longitudinal incision beneath the wing, running the length of the two first joints, and through this to remove the flesh. Lastly, the legs should be skinned, removing all the flesh, and leaving in the fibula or thigh bone. If the skin is to be mounted at once, anoint it thoroughly with powdered arsenic ap-

plied with the sifter; but if not, use the arsenical soap, because it can then be softened more readily when required for mounting. Fill the eye-sockets and cavity of the skull with cotton. Restore the leg and wing bones to position. To accomplish the latter, take hold of the tips of each, and pulling them from each other, they will easily slip into place. In turning the head back, take hold of the twine which is fastened to the bill, pulling it gently and steadily, working with the fingers when necessary, taking great care not to stretch or tear the skin of the neck. Smooth the feathers upon the various parts of the skin, and the specimen is ready for mounting.

The method of mounting a bird.—Having furnished yourself with tow, cotton, needle and thread, annealed iron wire of a size proportionate to that of the bird to be mounted, and the necessary instruments, including the large and small forceps, file, pincers, wire cutters, scissors, etc., proceed to cut fine a quantity of tow sufficient to fill the neck. With the long forceps seize a small bunch of this and insert it up through the neck and deposit it under the bill; in this manner fill from beneath the lower mandible down to the breast taking care not to insert too much stuffing or to place it unevenly. Next cut three pieces of wire; one a third longer than the total length of the body, for the main support, the other two three inches longer than the united length of the *tarsus* and *fibula*, for the leg supports; also four smaller ones five inches in length, for setting the wings and winding purposes. Sharpen each of these with the file to a fine point. Take the longest piece and bend in it three small rings, the distance between the two outer ones representing the length of the carcass of the bird, leaving one long and one short end, in the same manner as recommended in stuffing small quadrupeds. Tow should be wound about the end containing the rings, and moulded into the natural form of the body. This being completed, place the longest projecting end within the skin at the base of the neck stuffing,

and holding the head of the bird in the left hand, letting the skin hang down, with the right, insert it up through the cut tow within the neck, and thence through the top of the skull. Care must be taken not to push too hard, for by so doing you may displace the stuffing, but rather twirl the wire between the thumb and forefinger, when it will be found to penetrate easily. The skin must then be drawn over the artificial body, and the leg wires placed in position. The latter is done by placing the pointed end upon the sole of the foot, and forcing it up through the tarsus, between the skin and the bone, until the point has reached the first joint. The leg bones should then be turned out again, when the wire will appear as in Fig. 37 A, *w*. It should then be forced up a little above the top of the fibula, and cotton wound about both. This should be made to resemble the form of the flesh, which has been removed, and bound about with thread to prevent it from slipping (Fig. 37 B, *l*). The whole may then be turned back into its proper place. Now hold the protruding point against the side of the artificial body, about midway between the extremities, and force the wire through transversely, until it appears upon the opposite side, care being taken not to penetrate the skin. The end should be bent into the form of a hook, when, by taking hold of the protruding wire at the sole of the foot, and pulling it towards yourself, the hook will be firmly fastened into the body. The incision should now be closed up, by bringing the edges of the skin together, and made fast in this position with common pins; with ducks and larger birds it is necessary to sew up the lips of the incision. The legs are next brought towards each other, bending the wires close to the body until they are parallel. The joint of the fibula and tarsus should also be imitated. The bird is now ready to place upon a pedestal. All perching and climbing species should be mounted upon stands formed like the letter T; the



* *s*, skin; *f*, fibula; *w*, wire; *l*, artificial leg.

waders, swimmers, and all other species which frequent the land or water, ought to be placed upon flat pieces of board.

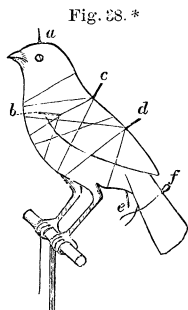


Fig. 38. *

The neck can now be bent into position, and the head directed either to the front or side, according to the taste of the operator. The wings are next raised up, and placed against the sides of the body, in the same position as when the bird was living, and fastened in place by means of the short wires forced through the shoulder into the body (Fig. 38, *b*). The tail is supported by means of a wire inserted beneath the tail feathers and passed into the body (*e*).

In placing birds in certain positions, it is necessary to spread the tail feathers. This may be accomplished in a variety of ways. First, by running a small pointed wire through the shaft of every feather; this method, however, is not applicable to very small birds. Another is to take a piece of cardboard, somewhat longer than the width of the tail spread out to its full extent, and cut a horizontal slit in it of the required length; the feathers are inserted in the slit, and are retained in whatever position they have been placed. This method is practiced only upon small birds. A third method is to take a piece of wire of small size and bend it double, pressing the bent end firmly together with the pincers; the tail feathers are then arranged between the two, that is with one wire above and the other beneath them. The two loose ends are then brought together and twisted to prevent them from springing apart; also to hold the feathers more firmly (Fig. 38, *f*). The latter method is applicable to birds of any size. The two remaining short wires should next be inserted into the body, one upon the back just below the curve of the neck, the other above the rump (*c* and *d*). These are used for convenience in winding, and can be removed after the specimen is dry. The feathers should be

**a*, head wire; *c* and *d*, back wires; *b*, wing support; *e*, tail support; *f*, tail spreader.

placed each in its proper place by means of the small forceps. If the eyes are not sufficiently plump a little cotton can be inserted through the eyelids, with a small quantity of putty, by which the glass eyes will be more firmly fixed; the latter operation should receive much care, the eye should have its natural fulness, and the eyelids should be well rounded. The bird should then be bound with thread, wound about the various protruding wires. This operation is done to keep the feathers in place until they are firmly fixed. A bird should not be allowed to *dry* too quickly, as the skin is then liable to shrink, but it should be placed in some *dry* place, not too warm, where the skin can gradually stiffen. When *dry* remove the thread, pull out the wires upon the back, and with the wire cutters, clip off the remainder close to the body. To insure success, the taxidermist should have a correct knowledge of the habits of birds, that he may place his subject in a position characteristic of the species. The measures previously taken will aid in securing accuracy of form.

Taxidermists, as a general thing, are apt to overstuff their specimens, and the beginner should strive to avoid this. There are several attitudes assumed by birds in the living state, which can be copied with advantage. To represent a bird in the flying position, its wings should be extended as far as possible, the tail placed horizontal and well expanded, the neck stretched forward and the legs drawn up close to the breast, with the toes closed. The wings may be spread by means of pointed wires inserted from the inside of the body, up through the wings beneath the skin, as far as the carpus, or fore arm. The wire can also be inserted from the outside near the joint of the carpus, and be forced down the wing between the skin and the bone, and thence transversely through the artificial body, into which it is fastened by means of a hook. These wires should be inserted before the leg wires are placed in position, and hooked into the artificial body, as in the former case. An interesting atti-

tude is when a bird is about to take flight. In this position the body should incline forward, and the wings be slightly raised; this can be accomplished by means of external wires placed beneath them, which are allowed to remain until the bird is dry. The moment of alarm is a striking position. To express this, the one foot must be stretched forward and the other drawn up near the body, and considerably bent. The body must be thrown to one side, with the wing on that side much elevated and spread out, while the other is placed lower and less diffuse; the tail must be expanded, thrown down at the point, and much arched; the neck should be stretched upward, and the head inclined towards the foot, which is drawn up; the eyelid should also be well rounded. The eagle can be placed in the position of seizing its prey, with wings and tail expanded, head thrown backward and crest erect, gazing upward. The vulture should have drooping wings to portray its sluggish habits. Such descriptions are endless, and indeed needless to a student of nature in its various details.

Remarks upon preparing, relaxing, and mounting dried skins.—The bird should be skinned in the ordinary manner, leaving *all* the bones of wings in their places, and the skin thoroughly anointed with arsenical soap. The neck should then be stuffed with chopped tow or cotton to its natural dimensions. The upper points of the humeri should be tied together at a distance from each other equal to that of the same when fixed in their sockets, otherwise the distance between the shoulder joints. The skin should next be filled with cotton or tow, and the incision sewed up, the legs turned inwards, crossed, and tied in this position, with a label attached containing descriptions.

One of the most efficacious methods of relaxing dried skins, is that employed by the ingenious Mr. Bullock. A box is made of convenient size, the top of which is free to lift on and off, without hinges or fastenings. The sides, top and bottom within are lined with a coating of plaster of

Paris, two or three inches thick. When any skins are to be relaxed, fill the box with water, and in this condition allow it to stand over night; in the morning any water remaining can be poured off, and the skins placed within. The lid of the box, being grooved, will shut close, and the wooden sides will prevent evaporation from going on. The box should be set in some damp situation. In twenty-four or forty-eight hours the skins will be sufficiently soft and pliant for mounting. It is necessary before placing the skins within the box, to render the feet and the bill pliable, that these parts should be enclosed in dampened rags or tow. Before moistening, the body should be opened and the inside stuffing taken out with the forceps. Another method is to fill the skin (the former stuffing having been previously removed) with cotton or rags saturated with water, enveloping it with a damp cloth, having wrapped the bill and feet as above stated. The former is preferable, as the latter does not relax all the parts equally. In some cases, however, especially with those of the aquatic families, it is necessary to prepare them after the latter plan, and in this condition to place them in the box described above.

The general method pursued in mounting dried skins is the same as that practiced upon fresh specimens. Difficulty is often experienced in placing the leg wires in position from the dry and shrivelled condition of the tarsi; this may be overcome by perforating them with the awl used for that purpose (recommended in the former article upon mammalia) previous to inserting the wires. With many of the skins of South American birds, prepared by the natives, a proper adjustment of the wings is found to be impossible. In this case it is necessary to cut them off close to the body, and fix them anew. In replacing the wings the scapulars should be carefully arranged to effectually conceal the joining of the wings. Any feathers disarranged in the operation should be properly adjusted with the small forceps.—*To be continued.*